We claim:

Sub a1

1. A method of separating two layers of material from one another and substantially completely preserving each of the two layers of material, the method which comprises:

providing two layers of material having an interface boundary between the two layers;

irradiating the interface boundary between the two layers or a region in vicinity of the interface boundary with electromagnetic radiation through one of the two layers;

absorbing the electromagnetic radiation at the interface or in the region in the vicinity of the interface and inducing a material at the interface boundary to decompose; and

separating the two layers of material.

2. The process according to claim 1, which further comprises providing a sacrificial layer at the interface boundary and wherein the absorbing step comprises absorbing the radiation with the sacrificial layer and decomposing the sacrificial layer.

3. The process according to claim 2, wherein the sacrificial layer is formed of a material having an optical band gap smaller than a band gap of one of the two layers.

2. ~~4~~. The process according to claim 1, wherein the absorbing step comprises inducing the decomposition by converting an energy of the absorbed radiation into heat.

3. ~~5~~. The process according to claim 1, which further comprises forming a temperature-sensitive sacrificial layer at the boundary interface, and wherein the absorbing step comprises absorbing the radiation in a part of one of the layers of material, diffusing the energy in form of heat into the temperature-sensitive sacrificial layer, and decomposing the sacrificial layer.

4. ~~6~~. The process according to claim 1, wherein the absorbing step comprises inducing a decomposition of the interface boundary by generating gas at the interface boundary with energy of the absorbed radiation.

5. ~~7~~. The process according to claim ~~6~~ 4, wherein the step of generating the gas comprises inducing a process selected from the group consisting of chemical reactions and sublimation.

6. ~~8~~. The process according to claim 1, wherein one of the two layers of material is a substrate and the other of the two layers of material is a semiconductor body selected from the group consisting of a semiconductor layer, a semiconductor

layer sequence, and a semiconductor layer structure, and the irradiating step comprises radiating the electromagnetic radiation through the substrate.

7. ~~8~~. The process according to claim ~~8~~ 6, which comprises applying the semiconductor body for mechanical stabilization on a support material.

8. ~~10~~. The process according to claim 1, wherein the irradiating step comprises exposing the material to one or more light pulses.

9. ~~11~~. The process according to claim 1, wherein the irradiating step comprises irradiating with two or more coherent laser beams, producing an interference pattern in the exposure, and increasing a local light intensity.

12. The process according to claim 8, wherein the semiconductor body consists at least partially of a material selected from the group consisting of GaN, AlN, InN, mixed crystals thereof, layer sequences, layer structures, and component structures thereof.

13. The process according to claim 2, wherein the sacrificial layer consists at least partially of a nitride material

selected from the group consisting of GaN, AlN, InN, and mixed crystals thereof.

17. ~~14~~. A method of laterally structuring a semiconductor layer or a semiconductor layer sequence disposed on a substrate, the method which comprises:

providing a substrate and a body of semiconductor material consisting essentially of at least one group III nitride material on the substrate, with an interface formed between the substrate and the semiconductor material;

irradiating the interface boundary or a region in vicinity of the interface boundary through one of the substrate and the semiconductor material;

absorbing the electromagnetic radiation at the interface boundary or in the region in the vicinity of the interface boundary and thereby inducing a decomposition of material at the interface boundary.

18. ~~15~~. The process according to claim 17 ~~14~~, which further comprises providing a sacrificial layer at the interface and wherein the absorbing step comprises absorbing the radiation with the sacrificial layer and decomposing the sacrificial layer.

19. ~~16~~. The process according to claim 18 ~~15~~, wherein the sacrificial layer is formed of a material having an optical band gap smaller than a band gap of one of the two layers.

20. ~~17~~. The process according to claim 17 ~~14~~, wherein the absorbing step comprises inducing the decomposition by converting an energy of the absorbed radiation into heat.

21. ~~18~~. The process according to claim 17 ~~14~~, which further comprises forming a temperature-sensitive sacrificial layer at the boundary interface, and wherein the absorbing step comprises absorbing the radiation in a part of one of the layers of material, diffusing the energy in form of heat into the temperature-sensitive sacrificial layer, and decomposing the sacrificial layer.

22. ~~19~~. The process according to claim 17 ~~14~~, wherein the absorbing step comprises inducing a decomposition of the interface boundary by generating gas at the interface boundary with energy of the absorbed radiation.

23. ~~20~~. The process according to claim 22 ~~19~~, wherein the step of generating the gas comprises inducing a process selected from the group consisting of chemical reactions and sublimation.

24. ~~21~~. The process according to claim 17 ~~14~~, wherein the irradiating step comprises exposing the material to one or more light pulses.

25. ~~22~~. The process according to claim 17 ~~14~~, wherein the irradiating step comprises irradiating with two or more coherent laser beams, producing an interference pattern in the exposure, and increasing a local light intensity.

26. ~~23~~. The process according to claim 17 ~~14~~, wherein the substrate consists essentially of a material selected from the group consisting of sapphire, $LiAlO_2$, $LiGaO_2$, $MgAl_2O_4$, $ScAlMgO_4$, and SiC.

27. ~~24~~. The process according to claim 26 ~~23~~, wherein the substrate is a sapphire substrate and the semiconductor material includes a layer of a Ga compound selected from the group consisting of GaN and $In_xGa_{1-x}N$, and the irradiating step comprises separating the semiconductor from the sapphire substrate by exposing through the substrate with a third harmonic of a Nd:YAG laser at a wavelength of 355 nm.

28. ~~25~~. The process according to claim 27 ~~24~~, which comprises pulsing the Nd:YAG laser with a Q-switch.

10. ~~26~~. A method of producing a freestanding component structure, which comprises separating, in accordance with the method according to claim ~~8~~ 6, a component structure from a substrate during or after a manufacture thereof.

11. ~~27~~. The method according to claim ~~26~~ 10, wherein the component structure is a component selected from the group consisting of diodes, light-emitting diodes, semiconductor lasers, transistors, and detectors.

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~~28. The method according to claim 26, wherein the component is a semiconductor laser, and the method further comprises producing an optical resonator of the semiconductor laser by cleaving a freestanding component structure along crystallographic lattice planes of epitaxial layers.~~

13. ~~29~~. A method of producing an optical component, which comprises, separating, in accordance with the method according to claim 1, an optical component from a substrate during or after a manufacture thereof.

14. ~~30~~. The method according to claim ~~29~~ 13, wherein the optical component is a component selected from the group consisting of diffraction gratings, thin film filters, optical couplers, and waveguides.